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ABSTRACT

The research project addressed itself to the problem of mastering the meaning of multiple-meaning words by 17 prelingually hearing impaired children (8-14 years old). It was hypothesized that it should be possible to develop programed instruction using visuals and vocabulary appropriate for a given designated group which could be individually presented to a student with a degree of learning to be expected to take place. Ten multiple-meaning words with 40 meanings were programed, with accompanying pre-post-tests. The programs were presented by means of a teaching machine which provided both visual and auditory stimuli, the latter, individually amplified for each testee. Inadequate allotment of time for the project precluded full developmental field testing. The presentation of the programs and tests differed in that in one school they were given by the program director. In the schools in which the programs and testing were a part of the regular school program--i.e., presented by the classroom teacher, scores increased to a statistical significance. Results indicated that individualized program instruction can be productive in teaching vocabulary and linguistics to hearing-impaired children if made a part of the regular program. (Included among appended material are an outline of objectives for each program unit, sample test frames for one unit, and tables with statistical data). (SBH)

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Final Report

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TEACHING VOCABULARY AND LINGUISTIC CONCEPTS TO PRE-LINGUALLY HEARING-IMPAIRED CHILDREN BY MEANS OF PROGRAMMED INSTRUCTION

October 31, 1973

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Office of Education
Bureau of Education for the Handicapped

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AUTHOR'S ABSTRACT

The research project, "Teaching Vocabulary and Linguistic Concepts to Prelingually Hearing-Impaired Children by Means of Programmed Instruction," addresses itself to the problem of the prelingually hearing-impaired child to acquire vocabulary and linguistic concepts because of limited sensory experience; more specifically with his difficulty in mastering the meaning of multiple-meaning words. The hypothesis of the project is that it should be possible to develop programmed instruction using visuals and vocabulary appropriate for a given designated group which could be individually presented to a student with a degree of learning to be expected to take place.

Ten multiple-meaning words with forty meanings were programmed, with accompanying pre-post-tests. The programs were presented by means of a teaching machine which provided both visual and auditory stimuli, the latter, individually amplified for each testee. Inadequate allotment of time for the project precluded full developmental field testing.

The presentation of the programs and tests differed in that in one school they were given by the program director. In the schools in which the programs and testing were a part of the regular school program, scores increased to a statistical significance. This was not true in school number three.

Individualized program instruction can be productive in teaching vocabulary and linguistics if made a part of the regular program.

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The research reported herein was performed pursuant to a grant from the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Education for the Handicapped

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PREFACE

This project was made possible by a grant from the Department of Health, Education, and Welfare, and is thus gratefully acknowledged.

Also grateful acknowledgement is made to the following: Dr. Josephine Carr, Oregon College of Education, Program Director: The Deaf; Dr. Wallace T. Bruce, Director, Tucker-Maxon Oral School, Portland, Oregon; Mrs. Dorothy McCarr, Media Specialist, SEIMC, formerly Principal of Oregon State School for the Deaf; Ms. Edith Schwartz, Director, Speech and Hearing Clinic, Chapman College, Orange, California; without whose sympathetic encouragement, and wise counsel, this project could not have been launched; to James McCarr, Asst. professor and Asst. Director, Teacher Education for the Deaf, Lewis and Clark College, whose patient guidance and expertise in individualized instruction have given invaluable direction to the project; to Terry Gentemann and Kurt Randall, both of Tucker-Maxon Oral School, and Phyllis Cammack, Asst. professor, George Fox College, for their work in the programming process; to Mr. G. I. Wilson, Principal, Salem School for the Deaf, and James Rawlins, and again to Dr. Wallace Bruce, for their cooperation in allowing their schools to become testing centers to the program; to Dr. Ciwa Griffiths, Executive Director, Hear Foundation, and Educational Director, Audrey McClure for initial testing of programs; to the staff of Edutronix for their technical assistance and generous use of equipment; to my wife who has willingly shared the pressures concomitant with this task; and especially to my grandson, whose hearing impairment at birth has presented him with a challenge which he has accepted and is winning-- who after all has been the initial and continuing motivation to make some contribution to those others thus handicapped.

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BODY OF REPORT

INTRODUCTION

What it is about

The research project, "Teaching Vocabulary and Linguistic Concepts to Prelingually Hearing-impaired Children by means of Programmed Instruction," addresses itself to the problem of the prelingually hearing-impaired child to acquire vocabulary and linguistic concepts because of limited sensory experience. The problem is more specific with his difficulty in mastering the meaning of multiple-meaning words. As it is pointed out in Multiple Meaning Manual by Project Life, multiple-meaning words present an intensified problem for the prelingually deaf child. It thus has a detrimental impact on the deaf child's rate of language development.

Hypothesis

The hypothesis of the project is that it should be possible to develop programmed instruction using visuals and vocabulary appropriate for a given designated group which could be individually presented to a student with a degree of learning to be expected to take place. It is based on the premise of the validity of the idea often expressed by Jerome Bruner of Harvard that one can teach a child almost anything if he can use language which the child can understand. However, in programming, this presents a dual challenge in that both the language and the visual must be within the realm of the child's experience. This concept will be emphasized later in the report.

Related Research

The use of programmed instruction for the teaching of the deaf is not new. A very excellent listing of references is to be found in an article by G.S. Pfau, "P. I.: An exploration with its effectiveness with the handicapped." The earliest listing is 1961. The project described in this report was influenced in general direction by Project Life which was explained in the above-mentioned article.

The specific goal of using multiple-meaning words and the use of a special hearing amplification device appeared to the researcher as being unique from other research which was then being done.

Scope of Survey

The nature of the project and the type of equipment used limited the scope of the research not only to a small segment of the designated population but also to a small number of words and concepts to be programmed. This limitation is inherent in the nature of the research project.

Objectives of the investigation

The primary objective was to develop programs to be used in a teaching machine which would in fact teach multiple-meaning words and linguistic concepts to prelingually hearing-impaired children at the third grade level.

METHODS AND PROCEDURES

Identification and description of subjects

Children at the third grade level were chosen, based on the observations of the consultants that plateauing occurs beyond this point, thereby making a more diverse population as the age increases. This phenomonon is further substantiated by the work done by Dr. June Miller, University of Kansas Medical Center, reported under "Academic Achievement," a study of the increment of progress in selected areas of achievement of children in elementary grades, in public and private schools, appearing in Volta Review, September, 1958.

Intelligence

Originally, it was proposed that I.Q. scores would be provided showing that the children were in normal range or above. Such scores were not available to the researcher, but the classification "normal or above" is felt by the reporter to be a valid one, based on the judgment of the administrators and teachers in the schools involved in the project.

Age

The original age spread was to be from 10-14 years. Actually, some of the subjects were as young as 8½ (see appendix). The number of students available made it necessary to be flexible in this respect.

Number

It was expected too that a total number from the schools tested would reach from 30 to 36. However, there were only available a total of 17, consisting of 2 groups of 5 from two schools, and 7 from the third school.

Hearing impairment

Impairment generally fell within 70 db. to 100 db. (see appendix) The ultimate choice of the students for the project was left to the discretion of the institutions involved. Their judgment was based on how well their students fit the specifications of the research.

Cooperating institutions

The three institutions which initially agreed to cooperate with the project were: Special Schools Division, School for the Deaf, Salem, Oregon; Tucker-Maxon Oral School, Portland, Oregon; and Chapman College, Speech and Hearing Clinic, Orange, California. Because the project was delayed a year beyond that which was initially planned, Chapman College, Speech and Hearing Clinic were unable to participate. Kelly School for the Deaf, of the Portland City School System, took its place.

Additional help was given by Education Division, Hear Foundation, Pasadena, California, and Hosford Center, another school allied with the Portland School System. Their role will be discussed under Field Testing.

Identification of words and meanings to be used

The proposal stated that the words would be taken from Multiple Meaning Manual, developed by PROJECT LIFE. A tentative list of 35 words was made: the criterion, appropriateness of the words for the third grade level. Again using the Multiple Meaning Manual, a checklist of multiple meanings for 29 of these 35 words was selected. Although meanings which seemed appropriate at the third grade level were predominate, there were also some meanings which could possibly be appropriate at a higher level.

These lists were submitted to appropriate people at Oregon State School for the Deaf, Tucker-Maxon Oral School, and Chapman College, Speech and Hearing Clinic with the request that they make the judgments. At least three out of the 4 checklists returned involved both teachers and administrators.

The director from these check lists made a new list of 10 words each of which had 5 to 8 meanings. These were the words and meanings which those involved with the programming used as the bases of the programs.

Equipment chosen for the project

Although it was the aim of the director to develop programs which could be adapted to almost any standard teaching machine, the one chosen for the project was originally developed on our own campus by one of the consultants for the project, Dr. Donald Chittick. It is manufactured by Edutronix Co. of Newberg, Oregon. It provides for both a visual and an auditory presentation, the latter on a cassette player. The programs are on slides. The projector has a multiple response mechanism. Five responses are possible, but usually the programs only called for three. When the correct response is made the slide carrier automatically proceeds to the next slide.

The casette tape is electrically pulsed so that it is synchronized with the progression of the slides in the slide carrier.

A third piece of equipment was used, a "Train-Ear," (trade name Hear-III) manufactured by Autronics Corporation of California and handled by the Hear Foundation. This is an amplification device with the same function as a hearing aid. By the nature of its construction it is more effective. This was connected directly to the tape player as close as possible to the tape head. This kind of a hook-up was designed to reduce machine noise. This equipment will be discussed further in the report.

Developing of programs and tests

The formation of the programs was a team effort: Mrs. Phyllis Cammack, Asst. professor, George Fox College, Terry Gentemann, Kurt Randall, teachers at Tucker-Maxon Oral School, along with the director of the project, with Mr. James McCarr of Lewis and Clark College as major consultant. Some orientation meetings were held. Words were divided between members of the team. The initial concern involved not only the script but also visualizations that would be understood by the children. Ideas from a group of students, members of a psychology class taught by the project director, were considered. An effort was made to have a short weekly meeting with the director and the teachers from Tucker-Maxon Oral School.

In the initial time schedule proposed for the project, the first summer was to have been the time for most of this work. One lesson taught by this project is that summer is an impossible situation because of unavoidable intervening variables. The result was that the work of programming and test devising had to be carried out during the academic year when most of those involved carried many other responsibilities.

The consideration of the format of the programs led to the consideration for the format of the tests to be used. In the absence of standardized tests to do what we needed to have done, a format of test construction appropriate for the project was indicated. Mr. McCarr was of invaluable assistance at this point. (See appendix for example of programmed units.) As the sample shows, the tests involved both visual and non-visual slides. Uses of the tests will be discussed later.

Method of Programming: general

With a group involved in program construction, instead of just one individual, it would be expected that there would be some variation. However, there is a general format followed which has the following plan. A program begins with introductory frames, then general teaching frames, followed by criterion frames. There are always non-visual frames at the last of the lesson as part of the criterion group. Sometimes, not always, non-visuals are used within the program. The first frames are simple and, we think, obvious. They progress to more difficult discriminations. Usually there are practice frames accompanying each criterion frame. Also in each program there are usually two predominant meanings, one in contrast to another.

As can be noted in the sample script in the appendix, there are used a visual with an elliptical sentence and choices; a visual with a choice of options listed in three sentences; or three visuals with the identification of the right picture to fit the script. Some of the programs review words already introduced.

Visualization

The cartoon motif was chosen for the presentation of programs, for the following reasons. This is a medium of communication familiar to children at this age, and made popular as a teaching tool by such programs as Sesame Street and General Electric. By this technique, action is possible to depict, even on a non-moving slide. This is a costly procedure, but an effective one. Color slides were chosen with the thought that sharper delineations would be made. Three different artists were used. Mrs. Paul Cammack began the art work programs and concluded two. The second cartoonist was a professional, P. Butler, from southern California. His visualizations were strictly cartoon format. He was very good, but very busy. Because of his other responsibilities, he was able to produce only three programs. The third artist, Jane Laughlin, of Portland, Oregon did work more illustrative in character, rather than the strict cartoon format. The artistic quality of the work of all three of the artists was good.

The children were not polled as to their preference, but there was no comment made by them on the difference of the style of the picture. The most adverse effect of using three different people was the slowing up of the production of the programs. This was a crucial factor, since it was one of the main obstacles in getting the programs done before the end of the

academic year. Adequate developmental field testing during the summer vacation months became an impossibility.

There appeared to be 4 crucial factors in the art work: (1) sharpness of delineation; (2) the ability of the artist to adequately and clearly depict what the programmer had in mind for the picture to say; (3) vivid bright colors; (4) visualizations within the experience of the student (a responsibility of both the programmer and the artist).

Field testing

It is the judgment of the reporter that there is no adequate substitute for developmental field testing. One program was completed sufficiently for preliminary field testing at a Portland school, Hosford Center. No formal statistical analysis was made. What this preliminary test seemed to indicate was: Identification of each slide, by number, both on the tape and on the slide, was necessary. Part three of the program required some slides to be redone for sharper delineation.

Some further field testing was done during the summer through the courtesy of the Education Director of Hear Foundation, Pasadena, California, Mrs. Audrey McClure. It quickly became apparent to Mrs. McClure that their particular summer school operation was not suited for an adequate developmental field-testing of the program for the following reasons: (1) Inadequacy of the length of time that the given student had for taking the pre-test, program, and post-test, since the students only came in once on one day per week for speech therapy. (2) The age of these students was younger than that specified by the program. Both factors entered into a problem of attention span, a problem not encountered in the subsequent presentations of the regular programs. However, it was her opinion that it had possibilities as an excellent teaching tool.

Institutional Administration and Testing of the Programs

The approaching deadline for the completion of the project precluded any further attempt for field testing. Procedures were set up for the administering and testing of the programs in the three centers: Tucker-Maxon Oral School, State School for the Deaf, Salem, Oregon, and Kelley School for the Deaf, Portland, Oregon.

Three complete and identical sets of equipment were provided. Robert McAlister, of the Kelley School, administered the programs for his school; Terry Gentemann, teacher at Tucker-Maxon, did the testing for her school; and the project director carried out the testing at the Oregon State School for the Deaf, at the request of the principal, Mr. G. I. Wilson. The project director had not planned on doing any of the testing himself, but had planned that all of it be done by the classroom teacher, but the participation thus provided gave opportunity for close observation by the project director of the reactions of the children involved in the test. Both Miss Gentemann and Mr. McAlister made it a part of their regular classroom routine. Their observations are in the appendix.

Mechanics

One of the objectives of the project was to develop a means of teaching which would allow for individualized instruction. It was therefore deemed important for the child to take the major responsibility in running the machine. This involved placing the slide tray, given by the teacher

into the machine, adjusting focus, inserting the tape in the player, punching the buttons for the desired response. This was soon learned, and the children were very emphatic that they wanted to do it and didn't need any help! The only deviation from this procedure was in the administration of the pre-test and post-test. The pre-test was administered to the groups as a whole, since the individualized aspect of the programs was not a factor. On the repeat for the post-test, the student did this individually, but since the slides were all punched for a D-button response, the student would circle his answer on a prepared answer sheet and push the D-button for advance to the next slide. They only had to be shown this variation in the program once. Doing it this way insured but one response to each test slide.

The group tested by the project director was from two different classes:- students judged to meet the requirements for the project by the administration. A separate testing room was set up and the individual children were sent in as needed. It was set up in this way in order not to disrupt their normal activities.

RESULTS

1. Test scores (see Appendix)

A. A scanning of all of the scores of the pre- and post-tests showed that there were those who made positive gains.

B. A statistical analysis made of all of the scores showed no significant difference between pre- and post-tests.

C. The scores were again inspected and it appeared that those students who were administered the program by their teachers did better on the post-test than did those who took the program under the supervision of the experimenter and/or his assistant. The scores of pupils in schools A and B, who were supervised by their own teachers in completing the programs, were treated separately (see table, Appendix). The difference between the means test for these students was significant. It is apparent that the programs administered under these conditions ennabled students to make higher scores on the post-test.

2. The final testing stage demonstrated that the programs and their method of presentation had high interest value. There were no problems in maintaining attention and cooperation.

3. It was demonstrated that the procedures provided effective student participation--an important factor in the learning process.

4. This project demonstrated that the use of the amplification device, the "Train-ear," was acceptable to the testees, and ability to use all of the equipment was quickly acquired.

CONCLUSIONS

1. In the absence of a setting which can be assumed to give an achievement orientation (as in the case of no instructions, or when an "outsider" is administering the program) little learning occurs. However, when the classroom teacher administers the program, learning does occur. It appears that the type of individualized instruction presented in this project can be an effective means of teaching vocabulary and linguistic concepts to hearing-impaired children.

2. Because of the pressure of time, the developmental testing stage of the programming process was bypassed in favor of administration of the final testing stage of the program. Had the former stage been used, it would have enabled the researcher to collect feedback from the testees for the purpose of eliminating or refining individual frames within the programs. Then program revisions, based on this feedback , could have been made, and the revised programs could have been fully tested on a parallel population. The pre-post-test scores of the latter testing would have been more indicative as to the proficiency of this method of instruction.

RECOMMENDATIONS

1. It is highly recommended that the present programs be fully field tested for further revision and refinement, and again be submitted to field testing for validation.

2. More programs should be developed for the hearing-impaired, especially with multiple-meaning words.

3. Other research should be done in respect to the relative value of the auditory-visual versus the visual input of this type of instruction.

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Reports by classroom teachers
administering the test

Dr. George Moore
George Fox College
Newberg, Oregon

Re: Programmed Instruction, Multiple word usage

In my classroom, I had the children work on the various programs independently. There was no problem in catching on to changing cassettes, slide trays or rewinding. This added interest to the activity.

Post and Pre-testing was done as a group. I ran the projector and pushed the "D" button for advance. One suggestion could be made if testing is to be done as a group effort. A remote extension to the projector and cassette player so that the teacher could stand in front of the room during the testing would be most helpful.

Also a counter to record mistakes would reduce a student jumping from one button to another until he finds the correct answer. I have observed that this is particularly the case on long programs. The kids really lose interest when they are too long.

The programs themselves were generally very good. Occasionally the pictures were difficult to interpret and match to the correct statement. However, this was rare. The kids enjoyed the programs. It's still a little early to tell how effective they were. We won't really know that until these words begin to show up (correctly) in the child's spontaneous speech and writing.

One final note. The amplification unit which accompanied the materials was excellent. It gave a clear, undistorted signal.

3-4 grade

Bob McAllister
Kelly Center, Portland, Oregon

This letter is in regard to the project conducted by Dr. George Moore. The idea of the children learning the meanings of words through two channels, sight and hearing, is excellent. However, I would have liked for the post-test to be different from the pre-test. By repeating the pre-test the child is able to take a second guess if he or she is still not sure. I think it would be an interesting point to test the same children with the same words at a later date this year to see if they did learn or retained any of the words. Personally, I would like to see more concepts (Math, Health, etc.) taught this way.

Terry Gentemann
Tucker-Maxon Oral School
Portland, Oregon

UNIT OBJECTIVES

UNIT 1 FACE — 40 teaching frames, 12 test frames, 52 total

Unit purpose: The student will learn to discriminate between the uses of the word FACE when used as a noun (sing. & plu.) with three variations of meaning and as a verb with one meaning.

Programmed words: face (n), faces (n), face (v), faces (v), facing.

Behavioral objectives:

The student,

(a) when given a visual, will select the appropriate word, phrase, or sentence for the noun FACE (sing. & plu.) with three meanings: (1) part of the human head; (2) part of the head of animals; and (3) the dial of a clock; and the verb TO FACE: to front on or to face toward.

(b) when given a word, phrase, or sentence, will select the appropriate visual which illustrates the above stated discriminations.

(c) will supply the appropriate form of the above variations of the word FACE without a visual if given the opportunity.

UNIT 2 LIKE — 27 teaching frames, 15 test frames, 42 total

Unit purpose: The student will learn to discriminate between the uses of the word LIKE when used as a verb with two variations of meaning and as a preposition with one meaning.

Programmed words: like (v), likes (v), liking, liked, like (preposition).

Behavioral objectives:

The student,

(a) when given a visual, will select the appropriate word, phrase, or sentence for two meanings of the verb TO LIKE: (1) feeling pleasure; and (2) to desire; and the preposition LIKE, showing a comparison.

(b) when given a word, phrase, or sentence, will select the appropriate visual which illustrates the above discriminations.

(c) will supply the appropriate form of the above variations of LIKE without a visual if given the opportunity.

UNIT 3 MAKE — Section A 23 teaching frames, Section B 19 " ", Section C 24 " ", 18 testing frames, 84 total

Unit purpose: The student will learn to discriminate between the uses of the word MAKE with six variations of meaning.

Programmed words: make (v), makes (v), making, made.

Behavioral objectives:

The student,

(a) when given a visual, will select the word, phrase, or sentence for the verb TO MAKE meaning: (1) to construct; (2) to be equal to; (3) to achieve, gain, or "make a living;" (4) to ridicule, "to make fun of;" (5) to cause to occur, "to make a good pet, etc.;" and (6) to pretend, "to make-believe."

(b) when given a word, phrase, or sentence, will select the visual that illustrates the above stated discriminations.

(c) will supply the appropriate form of the word MAKE without a visual if given the opportunity.

Section A (frames 1-23)

The student will demonstrate the above skills for these two meanings of TO MAKE: (1) to construct, fix, set in order, and (2) to be equal to.

Section B (frames 1-19)

The student will demonstrate the above skills for these two meanings of TO MAKE: (1) to achieve, gain, "to make a living;" and (2) to ridicule, "to make fun of."

Section C (frames 1-24)

The student will demonstrate the above skills for these two meanings of TO MAKE: (1) to cause to occur, "to make a good pet, etc.;" and (2) to pretend, "to make believe."

UNIT 4 PLAY

Section A 35 teaching frames
Section B 17 " "
15 test frames
67

Unit purpose: The student will learn to discriminate between the uses of the word PLAY when used as a noun (sing. and plu.) and as a verb with two variations of meaning.

Programmed words: play (n), plays (n), play (v), plays (v), playing, played.

Behavioral objectives:

The student,

(a) when given a visual, will select the word, phrase, or sentence for the word PLAY when used as a noun (sing. and plu.) meaning a dramatic production; and the verb TO PLAY with two variations of meaning: (1) to perform on a musical instrument; and (2) to engage in recreational activity or game.

(b) when given a word, phrase, or sentence, will select the visual that illustrates the above stated discriminations.

(c) will supply the appropriate form of the word PLAY without a visual if given the opportunity.

Section A (frames 1-35)

The student will demonstrate the above skills for these two meanings of PLAY: (1) a dramatic production; and TO PLAY: (2) to perform on a musical instrument.

Section B (frames 1-17)

The student will demonstrate the above skills for these two meanings of PLAY: (1) "to play like," to pretend; and (2) to play a position.

UNIT 5 WATCH

Section A 30 teaching frames
Section B 31 " "
Section C 30 " "
25 testing frames
116 total

Unit purpose: The student will learn to discriminate between the uses of the word WATCH when used as a noun (sing. and plu.) and as a verb with five variations of meaning.

Programmed words: watch (n) watches (n), watch (v), watches (v), watching, watched.

Behavioral objectives:

The student,

(a) when given a visual, will select the word, phrase, or sentence for the noun WATCH (sing. and plu.) meaning a time-piece; and the verb TO WATCH with five variations: (1) to observe; (2) to care for, take care of; (3) to "watch out for;" (4) to guard; and (5) to look with expectation.

(b) when given a word, phrase, or sentence will select the appropriate visual which illustrates the above stated discriminations.

(c) will supply the appropriate form of the above variations of WATCH without a visual if given the opportunity.

Section A (frames 1-30)

The student will demonstrate the above skills for the two variations of WATCH (n) (sing. and plu.) meaning a time-piece and the verb TO WATCH (v) meaning to observe.

Section B (frames 1-31)

The student will demonstrate the above skills for the two variations of TO WATCH (v): (1) to care for, and (2) to be careful, "to watch out."

Section C (frames 1-30)

The student will demonstrate the above skills for the two variations of TO WATCH (v): (1) to guard, and (2) to look for with expectation.

UNIT 6 FALL

42 teaching frames
15 testing frames
57 total

Unit purpose: The student will learn to discriminate between the uses of the word FALL when used as a noun with two variations of meaning and as a verb with three variations of meaning.

Programmed words: fall (n), fall (v), falls (v), falling, fell.

Behavioral objectives:

The student,

(a) when given a visual, will select the word, phrase, or sentence for the two variations of FALL (n): (1) season of year, and (2) descent, and the three variations of TO FALL (v): (1) to drop or descend; (2) to collapse, as a structure; and (3) to drop to a lower level.

(b) when given a word, phrase, or sentence, will select the appropriate visual which illustrates the above stated discriminations.

(c) will supply the appropriate form of the above variations of the word FALL without a visual if given the opportunity.

UNIT 7 START

26 teaching frames
9 testing frames
35 total

Unit purpose: The student will learn to discriminate between the uses of the word START when used as a noun with one meaning and as a verb with

two variations of meaning.
Programmed words: start (n), start (v), starts (v), starting, started.
Behavioral objectives:
The student,
(a) when given a visual, will select the word, phrase, or sentence for START (n) meaning place of beginning; and TO START (v) with two variations of meaning: (1) to begin an activity; and (2) to set up or establish.
(b) when given a word, phrase, or sentence, will select the appropriate visual which illustrates the above stated discriminations.
(c) will supply the appropriate form of the above variations of the word START without a visual if given the opportunity.

UNIT 8 RUN

Section A 27 teaching frames
Section B 25 teaching frames
Section C 27 teaching frames
18 testing frames
97 total

Unit purpose: The student will learn to discriminate between the uses of the word RUN when used as a noun with one meaning and as a verb with three variations of meaning.
Programmed words: run (n), run (v), runs (v), running, ran.
Behavioral objectives:
The student,
(a) when given a visual, will select the word, phrase, or sentence for RUN (n) meaning a score in base ball, and TO RUN (v) with five meanings: (1) to move legs quickly; (2) to flow; (3) to flee or escape, "to run away;" (4) to collide, "to run into;" and (5) to function or operate.
(b) when given a word, phrase, or sentence, will select the appropriate visual which illustrates the above stated discriminations.
(c) will supply the appropriate form of the above variations of the word RUN without a visual if given the opportunity.

Section A (frames 1-27)

The student will demonstrate the above skills by discriminating between the noun RUN: a score in baseball, and the verb TO RUN: to move legs quickly.

Section B (frames 1-25)

The student will demonstrate the above skills by discriminating between two variations of the verb TO RUN: (1) to flow; and (2) to flee or escape.

Section C (frames 1-27)

The student will demonstrate the above skills by discriminating between the two variations of the verb TO RUN: (1) to collide, "to run into;" and (2) to function or operate.

UNIT 9 TAKE

Section A 18 teaching frames
Section B 12 " "
Section C 13 " "
20 testing frames
63 total

Unit purpose: The student will learn to discriminate between the uses of the word TAKE when used as verb with six variations of meaning.

Programmed words: take (v), takes (v), taking, took.

Behavioral objectives:

The student,

(a) when given a visual, will select the appropriate word, phrase, or sentence for the verb TO TAKE with six meanings: (1) to get something; (2) to accept or receive; (3) to grip or seize; (4) to introduce into one's own body; (5) to win over or surmount; and (6) to remove.

(b) when given a word, phrase, or sentence, will select the appropriate visual which illustrates the above stated discriminations.

(c) will supply the appropriate form of the above variations of the word RUN without a visual if given the opportunity.

Section A (frames 1-18)

The student will demonstrate the above skills by discriminating between two variations of the verb TO TAKE: (1) to get something; and (2) to accept or receive.

Section B (frames 1-12)

The student will demonstrate the above skills by discriminating between two variations of the verb TO TAKE: (1) to grip or seize; and (2) to introduce into one's body.

Section C (frames 1-13)

The student will demonstrate the above skills by discriminating between two variations of the verb TO TAKE: (1) to win over or surmount; and (2) to remove.

UNIT 10 TELL

34 teaching frames
12 testing frames
46 total

Unit purpose: The student will learn to discriminate between the uses of the word TELL when used as verb with four variations of meanings.

Programmed words: tell (v), tells (v), telling.

Behavioral objectives:

The student,

(a) when given a visual will select the appropriate word, phrase, or sentence for four meanings of the verb TO TELL: (1) to give information, to inform; (2) to act as a talebearer; (3) to order or request; and (4) to relate in detail, to tell how.

(b) when given a word, phrase, or sentence will select the appropriate visual which illustrates the above stated discriminations.

(c) will supply the appropriate form of the above variations of the word TELL without a visual when given the opportunity.

One Page Sample UNIT 8 RUN Section A

1. The bear _____.
   A. is running.
   B. is sleeping
   C. is sitting.
2. The bear is running from the bees.
   The bear _____the bees.
   A. is running
   B. is running away from
   C. is running into
3. The bear _____the bees.
   A. is running into
   B. is running
   C. is running away from
4. The boy _____ with her doll.
   A. is running into
   B. is running away
   C. the run
5. The boy _____fast.
   A. is running
   B. is running into
   C. is running away from
6. The cat _____the dog.
   A. is running to
   B. is running away from
   C. is running into
7. The boy _____after the bus.
   A. is running into
   B. is running away from
   C. is running
8. The pig is running.
   A. B. C.
9. The girl is running away from the boy.
   A. B. C.
10. Joe is running away from home.
    A. B. C.
11. The girl is running up the hill.
    A. B. C.
12. The mouse_____ the cat.
    A. is running into
    B. is running
    C. is running away from
13. The girl _____with the boy.
    A. is running
    B. is running away from
    C. is running into
14. (CRITERION FRAMES)
    The man _____after the train.
    A. is running into
    B. is running
    C. is running away from
15. The man _____ the lion.
    A. is running into
    B. is running away from
    C. is running
16. (Practice frames)
    The man is running with the dog.
    A. B. C.
17. The dug is running away from the man.
    A. B. C.
18. The girl is running away from home.
    A. B. C.
19. The girl is running home.
    A. B. C.
20. (Non-visual)
    The girl _____the snake.
    A. is running
    B. is running away
    C. is running away from
21. (Non-visual)
    The man is chasing the boy.
    The boy _____the man.
    A. is running into
    B. is running away from
    C. is running
22. (Non-visual)
    He _____to catch the ball.
    A. is running
    B. is running into
    C. is running away from
23. (Non-visual)
    The man is late.
    He _____after the bus.
    A. is running into
    B. is running
    C. is running away from
24. (Non-visual)
    Mary _____to the store.
    A. is running away from
    B. is running into
    C. is running
25. (Non-visual)
    The lamb _____the dog.
    A. is running
    B. is running away
    C. is running away from

UNIT 8 RUN Test frames A B C

1. The boy _____ from home.
   A. ran into
   B. ran away
   C. the run
2. The horse ran away from the fire.
   A. ___B. ___C. ___
3. The children _____to school.
   A. are running away from
   B. are running
   C. the runs
4. The horses _____fast.
   A. are running fast
   B. the runs
   C. are running into
5. He _____the policeman. (non-visual)
   A. ran into
   B. ran away
   C. the run
6. Bobby _____fast.
   A. ran into
   B. ran
   C. the run

1. Water is _____through the pipes.
   A. running
   B. running into
   C. running away
2. Water is running in the streets.
   A. ___B. ___C. ___
3. Joe made a home _____.
   A. run into
   B. ran away
   C. run
4. The Red baseball team got one run.
   A. ___B. ___C. ___
5. The river _____through the field.
   A. ran into
   B. runs
   C. the run
6. The Tigers are winning the game.
   They have more _____.
   A. run away
   B. runs
   C. run into

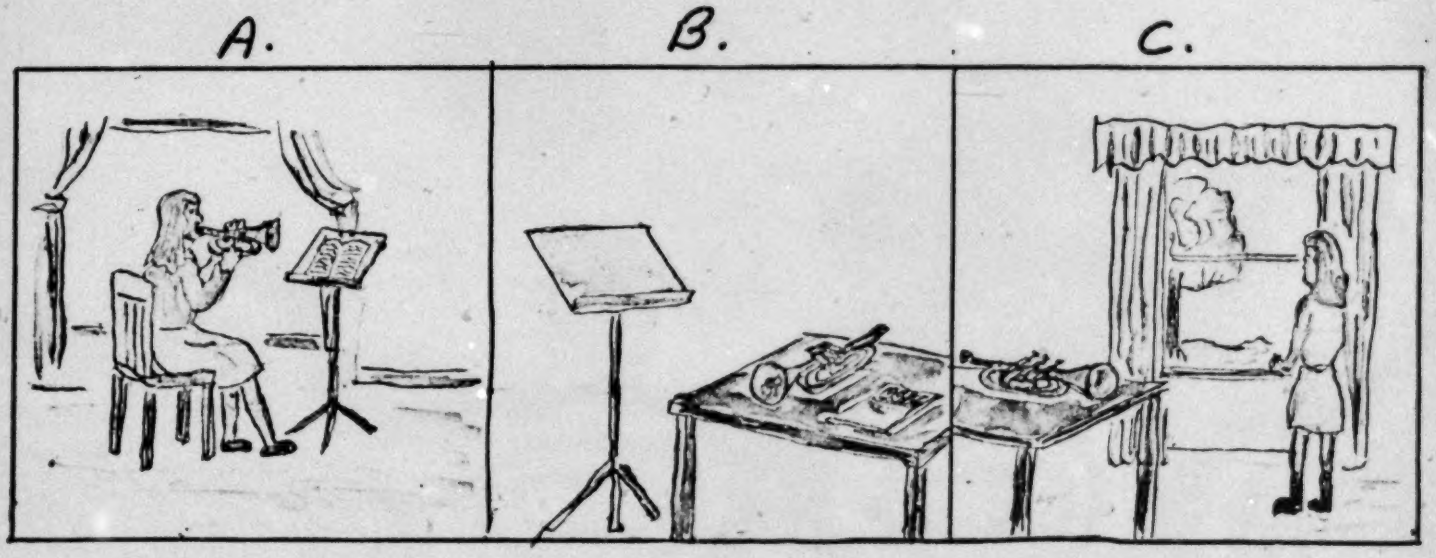
1. He plugged in the radio. It is _____.
   A. running.
   B. running into.
   C. running away.

2. He is running the projector.
   A. ___B. ___C. ___
3. My bicycle _____the ditch.
   A. ran
   B. ran into
   C. the run
4. Joe ran into Mike.
   A. ___B. ___C. ___
5. John met Mary.
   He _____Mary.
   A. ran away from
   B. ran into
   C. ran
6. Joe was cutting the grass.
   He _____the lawn mower.
   A. was running away.
   B. was running into
   C. was tunning

SAMPLE FRAMES

Julie makes a mud pie.

A.____ B.____ C. ____



Martha is playing the trumpet.

A._____B._____C._____

TF7

The little girls put on mother's dresses.

A. They are making dresses
B. The girls make faces
C. Let's make believe that we are mothers.

TFL

The boys are _____ toys.

A. breaking

B. making

C. make

Age and Hearing Loss of Testees

Name	Age	Hearing loss (r)	Hearing loss (l)
School A			
Andrea	8½	110 db	100 db
Carl	9	110	110
Tommy	8½	no response	110
Chris	8½	100	105
Derek	9½	72	88
School B			
Paige	11	70	110
Michelle	12	60	120
Len	11	90	120
Andy	11	90	120
Danny	13	70	110
School C			
Kevin	8	88	98
Vickie	9	107	95
Dannie		105	105
Laurie	8	97	102
Lori	8	103	106
Melody	9	88	85
Allyson	9½	107	103
Jill	8	90	93
Jo	8	103	90
Timmy		95	93

ALL TESTEES

STATISCAL ANALYSIS

	Mpre	Mpost	Mpre-Mpost Diff.
Andrea	7	8.55	+1.55
Carl	7.8	9.2	+1.40
Chris	9.0	9.4	+ .40
Derek	10.7	11.2	+ .50
Tommy	10.75	10.37	- .38
Jill	6.33	5.77	- .56
Jo	6.0	5.33	- .77
Kevin	7.66	10.33	+2.67
Melody	8.66	9.0	+ .44
Allyson	7.11	6.11	-1.00
Laurie	8.8	8.5	- .30
Lori	9.3	8.3	-1.00
Vicki	8.6	7.5	-1.10
Andy	12.0	12.5	+ .50
Len	11.0	11.8	+ .53
Mitchell	12.7	13.4	+ .70
Paige	11.5	12.3	+ .80
Σ =	154.91	159.56	+4.65
M =	9.112	9.385	.27
σ =	1.9615	2.3255	1.0056
σ_M =	.4903	.5814	

$\sigma_{DM} = .2514$

$$\bar{z} = \frac{.2730}{.2514}$$

$\bar{z} = 1.086$

Since 1.086 is less than 2.131 at the .05 level with a N of 17 minus two degrees of freedom, and since 1.086 is less than 2.947 at the .01 level with a N of 17 minus two degrees of freedom, this test cannot be considered significant at either level.

Groups A and B

STATISTICAL ANALYSIS

	Mpre	Mpost	Mpre-Mpost Diff	x	x^2
Andrea	7	8.55	1.55	+ .853	.7276
Carl	7.8	9.2	1.40	+ .703	.4942
Chris	9.0	9.4	.40	- .297	.0882
Derek	10.7	11.2	.50	- .197	.0388
Tommy	10.75	10.37	-.38	-1.077	1.1599
Andy	12.0	12.5	.50	- .197	.0388
Ken	11.0	11.8	.80	+ .103	.0106
Mitchell	12.7	13.4	.70	+ .003	.0001
Paige	11.5	12.3	.80	+ .103	.0106
	92.45	98.72	6.27		2.5788
M =	10.272	10.969	.697		
σ =	1.818	1.5835	.5342		
σ_M =	.6428	.5598	σ_{DM} = .1887		
Z =	3.6936				

With an N of 9 - 2 degrees of freedom 3.6936 is greater than 2.365 at the .05 level, and 3.6936 is greater than 3.497 at the .01 level. This means that where the teacher administered the tests to the students as part of the daily schedule, the approach made a significant difference.

INDIVIDUAL SCORES FOR PRE AND POST TESTS

Group C

Jill	Pre	Post	Jo	Pre	Post	Keven	Pre	Post
Face	4	2		6	8		4	9
Fall	8	6		5	4		10	9
Like	7	5		7	4		8	10
Make	5	3		5	7		6	12
Play	13	13		4	4		9	12
Run								
Start	2	5		4	2		2	5
Take	5	7		10	8		10	16
Tell	5	3		4	3		6	7
Watch	8	8		9	8		14	13
	57	52		54	48		69	93
	M=6.33	M=5.77		M=6.0	M=5.33		M=7.66	M=10.33

Melody	Pre	Post	Allyson	Pre	Post	Laurie	Pre	Post
Face	4	9		10	5		10	8
Fall	10	9		6	3		10	8
Like	8	7		8	6		11	7
Make	9	13					9	8
Play	6	7		6	8		5	4
Run				9	6		12	10
Start	7	5		4	4		8	7
Take	14	12		10	10		3	13
Tell	6	7		7	8		8	7
Watch	14	14		4	5		12	14
	78	81		64	55		88	85
	M=8.66	M=9.0		M=7.11	M=6.11		M=8.8	M=8.5

Lori	Pre	Post	Vicki	Pre	Post
Face	8	7		6	5
Fall	7	6		10	7
Like	11	11		10	8
Make	8	7		3	8
Play	10	9		6	7
Run	7	7		6	6
Start	7	5		5	5
Take	11	10		15	12
Tell	8	7		10	3
Watch	12	14		15	14
	93	83		86	75
	M=9.3	M=8.3		M=8.6	M=7.5

INDIVIDUAL SCORES FOR PRE AND POST TESTS

Group A

Andrea	Pre	Post
Face	5	6
Fall		
Like	10	7
Make	7	8
Play	5	13
Run	11	12
Start	3	2
Take	6	5
Tell	5	6
Watch	11	18
	63	77
	Mpre=7	Mpost=8.55

Carl	Pre	Post
	7	8
	8	8
	9	12
	11	7
	7	12
	9	12
	4	6
	5	10
	5	6
	13	11
	78	92
	Mpre=7.8	Mpost=9.2

Tommy	Pre	Post
	8	8
	10	9
	11	9
	10	8
	11	16
	16	10
	6	7
	14	16
	86	83
	M=10.75	M=10.375

Chris	Pre	Post
Face	8	8
Fall	8	8
Like	10	9
Make	11	13
Play	8	12
Run	11	10
Start	5	7
Take	10	7
Tell	5	6
Watch	14	14
	90	94
	M=9.0	M=9.4

Derek	Pre	Post
	10	12
	12	11
	13	6
	14	14
	5	11
	15	18
	5	4
	17	15
	11	9
	5	12
	107	112
	M=10.7	M=11.2

Group B

Andy	Pre	Post
Face	10	9
Fall	10	11
Like	15	14
Make	13	13
Play	8	11
Run	13	16
Start	9	7
Take	15	17
Tell	9	9
Watch	18	18
	120	125
	M=12.0	M=12.5

Len	Pre	Post
	10	9
	9	11
	10	12
	12	12
	11	12
	13	13
	5	6
	11	16
	11	11
	18	16
	110	118
	M=11.0	M=11.8

Mitchell	Pre	Post
	9	11
	12	10
	11	14
	16	16
	11	11
	14	16
	8	7
	15	17
	10	11
	21	21
	127	134
	M=12.7	M=13.4

Paige	Pre	Post
Face	7	9
Fall	8	10
Like	13	12
Make	13	12
Play	13	14
Run	1212	13
Start	5	7
Take	16	17
Tell	10	10
Watch	18	19
	115	123
	M=11.5	M=12.3